

REMARKS/ARGUMENT

Objected to Claims 27-30 have been amended to include the limitations of base Claim 23 and any intervening claims. Accordingly, Claim 27-30 stand allowable.

1) Claims 1-4, 8-19, 23-26 and 31-32 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Holtzman et al (US Patent No. 6,404,760 B1) in view of Aazhang et al (US Patent No. 6,529,495 B1) and Lim et al. (US Patent No. 6,240,999 B1). Applicants respectfully traverse this rejection as set forth:

Independent Claim 1 requires and positively recites, a method for extracting information transmitted by a desired user in a communications system from a received signal in the presence of interferers comprising: “derotating the received signals”, “determining channel estimates and detecting the presence of interferers” and “extracting information transmitted by the desired user from the received signal”.

Independent Claim 23, as amended, requires and positively recites, a receiver comprising: “a sampling unit coupled to a signal input, the sampling unit containing circuitry to sample a received signal provided by the signal input at a specified sampling rate”, “a channel estimation unit coupled to the sampling unit, the channel estimation unit containing circuitry to determine a number of users present in the received signal and to compute channel estimates for each user”, “a multiuser detection unit coupled to the channel estimation unit, the multiuser detection unit containing circuitry to extract information transmitted by a desired user from the received signal” and “a derotation unit having an input coupled to the sampling unit and an output coupled to the channel estimation unit and the multiuser detection unit, the derotation unit containing circuitry to apply a rotation of a specified amount to the sampled received signal”.

In contrast, Holtzman teaches weighted interference cancellation where more reliable symbols are given a larger weight and less reliable symbols are given a smaller weight when the interference is subtracted (col. 3, lines 10-26; col. 7, lines 30-57). Examiner argues that this teaching in Holtzman discloses “derotating the received signal (col. 3, lines 11-28). Applicants respectfully respond that interference cancellation is not the same or similar to “derotating” a signal. One having ordinary skill in the art would NOT equate these two concepts. The CDMA system disclosed by Holtzman would not implement derotation. Accordingly, Examiner’s determination is supposition not supported by fact and must be withdrawn.

Irregardless of what else Aazhang and Lim references teach or suggest, neither discloses the above-identified deficiency of the Holtzman reference. As such, any combination of Holtzman with Aazhang and Lim fails to teach or suggest, a method for extracting information transmitted by a desired user in a communications system from a received signal in the presence of interferers comprising: “derotating the received signals”, “determining channel estimates and detecting the presence of interferers” and “extracting information transmitted by the desired user from the received signal”, as required by Claim 1 OR “a derotation unit having an input coupled to the sampling unit and an output coupled to the channel estimation unit and the multiuser detection unit, the derotation unit containing circuitry to apply a rotation of a specified amount to the sampled received signal”, as required by Claim 23. Accordingly, the 35 U.S.C. 103(a) rejection of Claim 1 is improper and must be withdrawn. The 35 U.S.C. 103(a) rejection of Claim 23 has been overcome by the amendment to Claim 23.

In proceedings before the Patent and Trademark Office, “the Examiner bears the burden of establishing a prima facie case of obviousness based upon the prior art”. *In re Fritch*, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992) (citing *In re Piasecki*, 745 F.2d 1468,

1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984). “The Examiner can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references”, *In re Fritch*, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992)(citing *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988)(citing *In re Lalu*, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1988)).

Although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. **The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.** *In re Gordon*, 733 F.2d at 902, 221 USPQ at 1127. Moreover, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. *In re Gorman*, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed.Cir.1991). See also *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1138, 227 USPQ 543, 547 (Fed.Cir.1985).

Furthermore, "all words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. As discussed above, Examiner has failed to set forth any legitimate suggestion or motivation, either in the references themselves or in

the knowledge generally available to one or ordinary skill in that art, to combine and modify Holtzman in light of Aazhang and Lim, as suggested by Examiner. Second, there must be a reasonable expectation of success. Examiner has failed to provide any evidence that combining Holtzman with Aazhang and Lim will result in an apparatus that would successfully implement all of the elements of independent Claims 1 and 23 (as amended) and their respective dependent claims. Finally, the prior art reference (or references when combined) must teach or suggest ALL the claim limitations (MPEP § 2143). Applicants respectfully submit that the Examiner has failed to establish all three criteria. Accordingly, independent Claims 1 and 23 are patentable under 35 U.S.C. § 103(a) over Holtzman in view of Aazhang and Lim.

Claims 2-4, 8-19, 24-26, 31 and 32 stand allowable as depending directly from allowable Claim 1 and by including further limitations not taught or suggested by the reference of record.

Claim 2 further defines the method of Claim 1 further comprising prior to the derotating, sampling the received signal at a given sampling rate. Claim 2 depends from Claim 1 and is allowable for the same reasons provided above in support of the allowability of Claim 1.

Claim 3 further defines the method of Claim 2, wherein the received signal is transmitted at a symbol rate, and wherein the sampling rate is essentially equal to the symbol rate. Claim 3 depends from Claim 2 and is allowable for the same reasons provided above in support of the allowability of Claim 2.

Claim 4 further defines the method of Claim 2, wherein the received signal is transmitted at a symbol rate, and wherein the sampling rate is higher than the symbol

rate. Claim 4 depends from Claim 2 and is allowable for the same reasons provided above in support of the allowability of Claim 2.

Claim 5 further defines the method of Claim 1, wherein the determining comprises: “generating a list of hypotheses”, “computing an error variance for each hypothesis in the list of hypotheses”, “selecting a hypothesis associated with a smallest computed error variance” and “computing channel estimates from the selected hypothesis”. Claim 5 depends from Claim 1 and is allowable for the same reasons provided above in support of the allowability of Claim 1.

Claim 6 further defines the method of Claim 5, wherein a hypothesis contains information about a desired user and any expected interferers. Claim 6 depends from Claim 5 and is allowable for the same reasons provided above in support of the allowability of Claim 5.

Claim 7 further defines the method of Claim 6, wherein a hypothesis further contains timing offset information. Claim 7 depends from Claim 6 and is allowable for the same reasons provided above in support of the allowability of Claim 6.

Claim 8 further defines the method of Claim 1, wherein the determining provides a number of users transmitting in the communications system, wherein the number of users provided by the determining includes the desired user, and wherein the extracting comprises: for each user, “computing transmitted symbols”, “computing contribution of the transmitted symbols from the user”, “removing the computed contribution from the received signal” and the method further comprising, “recomputing the transmitted symbols from the desired user”. Claim 8 depends from Claim 1 and is allowable for the same reasons provided above in support of the allowability of Claim 1.

Claim 9 further defines the method of Claim 8, wherein the first computing comprises applying a channel estimate for the user to the received signal. Claim 9 depends from Claim 8 and is allowable for the same reasons provided above in support of the allowability of Claim 8.

Claim 10 further defines the method of Claim 9, wherein an equalizer is used to apply the channel estimate to the received signal. Claim 10 depends from Claim 9 and is allowable for the same reasons provided above in support of the allowability of Claim 9.

Claim 11 further defines the method of claim 8, wherein the second computing comprises multiplying the computed transmitted symbols with a channel estimate for the user. Claim 11 depends from Claim 8 and is allowable for the same reasons provided above in support of the allowability of Claim 8.

Claim 12 further defines the method of Claim 8, wherein the desired user is a first user whose computed contribution is subtracted from the received signal, and wherein the recomputing comprises: “combining a received signal with the computed contribution from the first user removed with a received signal with the computed contributions from each user removed” and “applying a channel estimate for the first user to the combined received signal”. Claim 12 depends from Claim 8 and is allowable for the same reasons provided above in support of the allowability of Claim 8.

Claim 13 further defines the method of Claim 12, wherein the applying is performed by an equalizer. Claim 13 depends from Claim 12 and is allowable for the same reasons provided above in support of the allowability of Claim 12.

Claim 14 further defines the method of Claim 8, wherein ordering of the users is performed. Claim 14 depends from Claim 1 and is allowable for the same reasons provided above in support of the allowability of Claim 1.

Claim 15 further defines the method of Claim 14, wherein the ordering is based on a numbering of the users. Claim 15 depends from Claim 14 and is allowable for the same reasons provided above in support of the allowability of Claim 14.

Claim 16 further defines the method of Claim 14, wherein the ordering is based on the users' channel energy. Claim 16 depends from Claim 14 and is allowable for the same reasons provided above in support of the allowability of Claim 14.

Claim 17 further defines the method of Claim 14, wherein the ordering is based on SIR. Claim 17 depends from Claim 14 and is allowable for the same reasons provided above in support of the allowability of Claim 14.

Claim 18 further defines the method of Claim 14, wherein the ordering is based on SINR. Claim 18 depends from Claim 14 and is allowable for the same reasons provided above in support of the allowability of Claim 14.

Claim 19 further defines the method of Claim 8, wherein the extracting can be repeated for the same set of transmitted symbols. Claim 19 depends from Claim 8 and is allowable for the same reasons provided above in support of the allowability of Claim 8.

Claim 24 further defines the receiver of claim 23, wherein the multiuser detection unit can extract the information transmitted by the desired user in a single iteration, and wherein to improve upon the quality of the extracted information, the multiuser detection unit can repeatedly iterate on the received signal. Claim 24 depends from Claim 23 and is allowable for the same reasons provided above in support of the allowability of Claim 23.

Claim 25 further defines the receiver of claim 24, wherein the multiuser detection unit repeatedly iterates on the same received signal. Claim 25 depends from Claim 24

and is allowable for the same reasons provided above in support of the allowability of Claim 24.

Claim 26 further defines the receiver of claim 23 further comprising a derotation unit having an input coupled to the sampling unit and an output coupled to the channel estimation unit and the multiuser detection unit, the derotation unit containing circuitry to apply a rotation of a specified amount to the sampled received signal. Claim 26 depends from Claim 23 and is allowable for the same reasons provided above in support of the allowability of Claim 23.

Claim 31 further defines the receiver of claim 23, wherein the receiver is part of a wireless device used in a synchronous communications system. Claim 31 depends from Claim 23 and is allowable for the same reasons provided above in support of the allowability of Claim 23.

Claim 32 further defines the receiver of claim 31, wherein the synchronous communications system is a GSM compliant communications system. Claim 32 depends from Claim 31 and is allowable for the same reasons provided above in support of the allowability of Claim 31.

2) Claims 5-7 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Holtzman et al (US Patent No. 6,404,760 B1) in view of Aazhang et al (US Patent No. 6,529,495 B1) and Lim et al. (US Patent No. 6,240,999 B1) as applied to claims 1-4 above, and further in view of Love (US Patent No. 5,818,876). Applicants respectfully traverse this rejection as set forth:

Independent Claim 1, upon which Claims 5-7 depend directly, or indirectly, requires and positively recites, a method for extracting information transmitted by a desired user in a communications system from a received signal in the presence of interferers comprising: “**derotating the received signals**”, “determining channel estimates and detecting the presence of interferers” and “extracting information transmitted by the desired user from the received signal”.

In contrast, Holtzman teaches weighted interference cancellation where more reliable symbols are given a larger weight and less reliable symbols are given a smaller weight when the interference is subtracted (col. 3, lines 10-26; col. 7, lines 30-57). Examiner argues that this teaching in Holtzman discloses “derotating the received signal (col. 3, lines 11-28). Applicants respectfully respond that interference cancellation is not the same or similar to “derotating” a signal. One having ordinary skill in the art would NOT equate these two concepts. The CDMA system disclosed by Holtzman would not implement derotation. Accordingly, Examiner’s determination is supposition not supported by fact and must be withdrawn.

Claim 5 further defines the method of claim 1, wherein the determining comprises: “generating a list of hypotheses”, “computing an error variance for each hypothesis in the list of hypotheses”, “selecting a hypothesis associated with a smallest computed error variance” and “computing channel estimates from the selected hypothesis”.

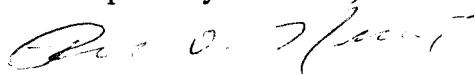
Claim 6 further defines the method of claim 5, wherein a hypothesis contains information about a desired user and any expected interferers.

Claim 7 further defines the method of claim 6, wherein a hypothesis further contains timing offset information.

Irregardless of what else the Aazhang and Lim and Love references teach or suggest, none disclose the above-identified deficiency of the Holtzman reference. As such, any combination of Holtzman with Aazhang and Lim and Love fails to teach or suggest, a method for extracting information transmitted by a desired user in a communications system from a received signal in the presence of interferers comprising: “derotating the received signals”, “determining channel estimates and detecting the presence of interferers” and “extracting information transmitted by the desired user from the received signal”, as required by Claim 1. Claims 5-7 depend from Claim 1 are therefore similarly allowable.

Applicants appreciate Examiner’s determination that Claims 20-22 would be allowable if amended to include the limitations of base Claim 1 and any intervening claims, but in light of the above arguments in support of the allowability of Claim 1, Applicants respectfully submit that Claims 20-22 are allowable in their present form. Claims 1-19, 23-26, 31 and 32 stand allowable over the cited art. Applicants respectfully request allowance of the application as the earliest possible date.

Respectfully submitted,



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